

國立成功大學

113學年度碩士班招生考試試題

編 號：280

系 所：環境醫學研究所

科 目：機率與統計

日 期：0202

節 次：第 2 節

備 註：可使用計算機

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Please provide complete and detailed calculations. If only answers are provided, then no credits are to be given.

A. (20% with 10% each)

It is known that 5% of the books bound at a certain bindery have defective binding. Find the probability that 2 of 100 books bound by this bindery will have defective bindings, using

1. the formula for the binomial distribution;
2. the Poisson approximation to the binomial distribution.

B. (20% with 10% each)

If the amount of cosmic radiation to which a person is exposed while flying by jet airplane across the United States is a random variable having the normal distribution with mean 4.35 mrem and standard deviation 0.59 mrem, find the probabilities that the amount of cosmic radiation to which a person will be exposed on such a flight is:

1. between 4.00 and 5.00 mrem;
2. at least 5.50 mrem.

C. (20% with 10% each)

Let $X_1, X_2, X_3, \dots, X_{20}$ be independent and let each have the same marginal distribution with mean 10 and variance 3. Find

1. $E(X_1 + X_2 + X_3 + \dots + X_{20})$;
2. $\text{Var}(X_1 + X_2 + X_3 + \dots + X_{20})$.

D. (40% with 10% for 1 and 2 each, and 20% for 3)

If 2 random variables have the joint probability density function

$$f(x, y) = \begin{cases} xy & \text{for } 0 < x < 1, \quad 0 < y < 2 \\ 0, & \text{elsewhere} \end{cases}$$

1. Find the probability that both random variables will take on values less than 1;
2. Find the probability that the sum of the values taken on by the 2 random variables will be less than 1;
3. Find the joint cumulative distribution function of the 2 random variables.